

W. & L. E. Gurley Building
514 Fulton Street
N.E. Corner of Fulton Street and
Fifth Avenue
Troy, Rensselaer County,
New York

HAER No. NY-13

HAER
NY,
42-TROY,
8-

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Office of Archeology and Historic Preservation
National Park Service
U.S. Department of the Interior
Washington, D.C. 20240

HISTORIC AMERICAN ENGINEERING RECORD

W. & L. E. GURLEY BUILDING
HAER No. NY-13

HAER
NY,
42-TROY,
8-

Location: 514 Fulton Street
N.E. Corner of Fulton Street and Fifth Avenue
Troy, Rensselaer County, New York
Latitude: 42° 43' 50" N. Longitude: 73° 40' 50" W.

Date of Erection: 1862

Designer: Unknown

Present Owner: Teledyne Corporation

Present Occupant: W. & L.E. Gurley Manufacturing Company

Present Use: Manufacture of surveying instruments

Significance: Manufacturing engineering and surveying instruments since the mid-nineteenth century, the Gurley Company made the first all aluminum transit for the 1876 Philadelphia Exposition. Highly acclaimed by civil engineers, Gurley instruments have been used in the building of major structures. The firm remains an active and important, skilled industry in Troy. The building is a typical urban factory of the period, but considerably above average in workmanship and detail. It is essentially unaltered.

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Original and subsequent owners: Previously owned and operated continuously by the Gurley family and local associates, the W. & L.E. Gurley Company was recently acquired by the Teledyne Corporation of California.
2. Original purpose and construction of building: The original Gurley Company building was destroyed in the Great Fire of May 1862. The present building was completed and the firm back in operation by December of that same year.
3. Alterations and additions: Sometime after 1889, two cast iron balconies were attached to the second and third stories on the Fulton Street facade, toward the east end. The display windows at the Fifth and Fulton corner which appear on an old photograph have been transformed into a diagonal doorway. The original, floral finials on the cornice have been removed.

B. Corporate History:

W. & L. E. Gurley: Historic Manufacturers of Surveying and Scientific Instruments.

In the long history of this unusual industrial concern, dating back to 1845, is embodied a remarkable record of an ambivalent, almost contradictory character. On the one hand there is its continued location on the same site in downtown Troy, at Fifth Avenue and Fulton Street, since its very foundation, the longest on record in Troy's history. It has, indeed, occupied the same four-story building since 1862, which was built hurriedly in less than a year, to replace an older structure destroyed in Troy's greatest fire. Its outer appearance and the inner arrangement of rooms and their very furnishings still convey the quaint air and patina of age and tradition. The very organization and management of its industrial and business processes still suggest the personal and paternal characteristics of another and past age of small-scale, individualized, and family operation. The products too are of a special kind which require great skill to manufacture. They are surveying and measuring instruments used in many fields, and their relatively limited demand and great variety of form would seem to resist any high degree of production mechanization or automation.

Nevertheless, and on the other hand, the Gurley business has grown continuously and acquired a progressively advanced character. It has not stood still but broadened its line of products from the original few surveying instruments to include a broad spectrum of new instruments and devices in such fields as weights and measures, meteorology, hydraulics, and others. Its technical skills of hand, eye, and tool have persisted and continue to determine the quality of product. It is perhaps noteworthy that when the final and almost inexorable process of modern merger finally reached the Gurley firm, only as recently as 1967, by one of the most dynamic and technologically oriented conglomerates in American industry, the Teledyne Corporation of California, it proved to be a valuable acquisition, however modest in magnitude. Teledyne's other components include underwater exploration for oil, electronic and space mechanisms and devices, and similar sophisticated areas of modern technology. If absorption into a large industrial complex was an inevitable trend, it was almost a compliment to be sought out as suitable by such an advanced and, as it were, fast company.

The roots of the Gurley concern go far back into the very foundations of American and Troy industry in the early nineteenth century. Indeed, the surveying instruments which were its principal products belong to an even earlier age of discovery and exploration through which the American continent was surveyed and plotted and by which the roads, canals, and railroads were planned and constructed. Surveying instruments

accompanied the earliest explorers, surveyors, and engineers who laid the basis for the American nation, politically, economically, and socially. Their manufacture goes back to a great number of skilled mechanics and artificers whose contributions are recorded in The Makers of Surveying Instruments in America Since 1700 by Charles E. Smart, a former Gurley president and the creator and curator of its remarkable collection of early surveying instruments. These go back to examples by David and Benjamin Rittenhouse of Philadelphia in the eighteenth century.

The ultimate sources of the Gurley enterprise, however, are in Connecticut, that early home of the mechanical arts in America, which produced Eli Whitney, Eli Terry, and Samuel Colt among many others. The Gurleys came originally from Mansfield, Connecticut, which was also the home of the Hanks family, celebrated as pioneers in the manufacture of bells, surveying instruments, and other metal products. Benjamin Hanks and several sons came to Gibbonsville, across the Hudson River from Troy, as early as 1808, where he established a foundry and shop for these products. These ultimately developed into the Meneely bell works, controlled by Andrew Meneely, an apprentice who married into the Hanks family. His descendants flourished in the bell industry on both sides of the river, operating bell manufactories both in Troy and Watervliet until quite recent years. Julius Hanks, a son of Benjamin, came to Troy in 1825 where he established a foundry for "church bells, clocks, castings, and surveyor's instruments of the most improved construction." The site was at the corner of Fulton Street and Fifth Avenue, precisely where Gurley's is now located. Here arose a rather graceful frame building, which even boasted a bust of Benjamin Franklin, the patron of American science, over one of its doorways. Here Oscar Hanks succeeded to his father's business, and here William Gurley, founder of the Gurley enterprise, entered as an apprentice in 1840.

William Gurley's own antecedents were of the same character. His father, Ephraim, also came from Mansfield, and as early as 1813 settled in Gibbonsville, now Watervliet, where a new arsenal, established during the War of 1812, gave an impetus to industry. In 1818 Ephraim Gurley moved to Troy and in partnership with two Hanks brothers, established the Troy Air Furnace for castings of various kinds. Here, on Fifth Avenue, near the present Gurley plant, were born both his sons, William and Lewis E. The father died in 1829, when both sons were very young, and they were brought up by the mother. William Gurley attended the Rensselaer Institute, a newly conceived institution founded in 1824 for the "application of science to the common purposes of life." The patron was Stephen Van Rensselaer, the principal landlord in the region, but the innovative head was Amos Eaton, a zealous advocate of

and itinerant lecturer on applied science. He was William's teacher, and he recommended Gurley highly for scientific competence on graduation in 1839.

Armed with Eaton's recommendation, Gurley went west to Michigan, but was unable to find engineering employment in 1839, a year of severe depression. Returning to Troy, Gurley entered the Hanks works as an apprentice and in time he became foreman of the shop. In 1846 William Gurley formed a partnership with Jonas Phelps, another Hanks apprentice, and as Phelps and Gurley began the manufacture of "mathematical and philosophical instruments." Some of the early products of this period are in the Gurley museum. In 1851 Gurley's younger brother, Lewis, joined the business following his graduation from Union College in Schenectady. Phelps soon sold out, and the two brothers launched on their long business career together in 1852 by buying out Oscar Hanks and acquiring the Hanks works at their present location. Thus was launched an enterprise that was to expand and to become by the end of the nineteenth century the largest manufacturer of surveying instruments in the country. Their instruments went with the engineers of both North and South America, many of them graduates of Rensselaer Polytechnic Institute, to survey the wild western lands and lay out the railroads which were to unite it into a single market and nation. Gurley instruments were, indeed, used all over the world, in Asia, Africa, and Australia, as well as throughout all of Latin America. During the Civil War, the Gurley firm demonstrated its flexibility and prospered by turning its facilities to the manufacture of fuses for shells and even brass fittings for cavalry saddles. Although the factory was totally destroyed in the Great Fire of 1862, it was restored within the year, and its continued use to the present time bears testimony to the solidity of the structure.

Throughout the century there was the continuity of enterprise and management provided by the two brothers, William and Lewis Gurley. Interestingly enough, as they prospered, both men found time to devote to numerous civic activities. William Gurley, particularly, participated in the political life of the community, but even more in the patronage and promotion of cultural and educational institutions. William and Lewis were involved in the affairs of the Young Men's Christian Association and the public library which it sponsored. Both shared in the re-organization and modernization of the Emma Willard School, and William was a trustee and vice-president of Rensselaer Polytechnic Institute, of which he was a graduate.

The Gurley enterprise was fortunate to have the life-long services of Edward Arms, who was a kind of mechanical genius and became chief engineer of Gurley's. His employment there began in 1862, at seventeen years of age, and lasted for seventy-two years until 1934. In this unprecedented length of time, Arms managed to graduate from Rensselaer Polytechnic Institute

in 1869 and to dedicate himself to the improvement of surveying instruments and their manufacture. He was particularly interested in the refinement of the circular dividing engine, so vital in the production of transits and compasses as precise measuring devices. In this connection, it is noteworthy that Arms and another Gurley employee, Theodore Schneider, were very helpful to Henry A. Rowland when he taught physics at Rensselaer, in his research that led to his appointment as the first professor of physics at the newly formed Johns Hopkins University at Baltimore. Here he became world famous for his development of the fine dividing engine that ruled the lines on glass diffraction gratings used in spectroscopy. In this Rowland undoubtedly owed much to the skill of Arms at Gurley's, and to Schneider who followed him to Johns Hopkins as his mechanical assistant. Incidentally, while Arms' service was the longest on record, loyalty and length of employment were common in this long-lived family enterprise.

Arms' autobiographical record of his life and work at Gurley's includes many other improvements, too numerous to itemize. Among them was the construction of the first light-weight transit, made from aluminum bought in France at \$1.30 per ounce. It was displayed at the Centennial Exposition in Philadelphia in 1876, across the aisle from Alexander Graham Bell's newly invented telephone, and it is now in the Gurley museum. A version of it was subsequently offered for sale as a light mountain transit. Arms devised a method for drawing platinum wire to the fine diameters required in the transit telescope, and he was gifted in lens optics as well. At the Columbian Exposition in Chicago in 1893 Gurley's displayed an eleven-inch telescope which won the approval of Alvin Clark, the world's greatest lens maker.

From its rather unusual character as a manufacturer of surveying instruments the Gurley concern entered into other related activities. The most important of these was publication of a volume as early as 1855 which was more than a sales catalog. It was "A Manual of the principal instruments used in American Engineering and Surveying." It was really the first of its kind in America, an illustrated, instructional account of the instruments and their uses, without any references to prices. This manual was re-issued and sold at a nominal figure year after year, the fifty-second edition as recently as 1951. In 1881 Gurley's published an Ephemeris, for use by engineers, which is still issued in an annual edition, as an "abridgement of the Nautical Almanac." A "Manual of Gurley Hydraulic Engineering Instruments" was brought out in 1881. In addition, the Gurley concern offered for sale during the nineteenth century a substantial list of books for engineers as well as a wide variety of engineering supplies, from paper and tracing cloth to pens and pencils. It had become, by the end of the century, a leading manufacturer and supplier of engineering instruments and related materials in the nation.

William Gurley died in 1887 and his brother Lewis a decade later. This brought to an end the first stage of the company's history, one of growth and prosperity. By 1899 Gurley's had been incorporated, although it was still carried on as a family business by Lewis' son, William F. Gurley, and by William's son-in-law, Paul Cook. During these years the company expanded into new fields. In connection with the establishment of the National Bureau of Standards in 1904 Gurley's was persuaded to engage in the manufacture of weights and measures. The first edition of "Gurley's Handbook of Weights and Measures for the Use of Sealers" appeared in 1906. In 1908 a new department was created under the name of Department P, for "physical and scientific instruments," and a publication was then issued listing "Physical and Scientific Instruments and Mechanical Apparatus." It was not successful and "Department P" was sold a few years later to a Massachusetts concern.

By the time of World War I, Gurley's line of direct family management had run out, and there was a great need for new outside personnel to carry on the business. In 1919 and 1920 two men were brought in, who became respectively General and Works Managers and successively presidents of the firm during the next generation. These were Charles I. Day, a Columbia-trained engineer, and Charles E. Smart, a graduate of Massachusetts Institute of Technology. They were joined by Lester C. Higbee, a graduate of Rensselaer Polytechnic Institute, who followed them subsequently as president of Gurley's. Under their combined leadership the methods and machinery of Gurley's were modernized. New lines of products were added and others revived, among them hydraulic and meteorological instruments, which were used for measuring both wind and water currents, as well as the traditional surveying instruments.

World War II resulted in a great demand for technical instruments of all kinds, and as early as 1942 the United States Navy and Army awarded the firm the "E" pennant, which flew over Gurley's as a symbol of efficiency and excellence in meeting war demand. During the war the largest output of transits in all of its history was recorded. The growth of electronic and space technology in post-war America also provided an impetus to the development of new devices and instruments in these fields, to which Gurley responded successfully.

In time, however, the question of whether the company could operate and grow in the relative isolation of its traditional Troy setting was bound to become acute. This was of particular concern as the problem of new management arose and the established line of family and intra-plant direction was exhausted. The trend of the time was toward industrial con-

solidation into large and diversified conglomerates, favored by the advent of computers and other new means of control and coordination. In 1967 this happened to Gurley's. A conglomerate from the Far West, Teledyne, Inc., acquired the local company and installed its own management in the person of a new president.

New problems arose affecting the continued survival and operation of Gurley's as a separate, autonomous enterprise. Particularly there was a question of complete urban renewal and the consequential removal of the business to a new site in Troy. Negotiations with the city's planning authorities began for a location in a new industrial park established in the outskirts of the city because the old site and buildings stood in the downtown renewal area. Thus Gurley's is engaged at this moment in a crucial process of relocation and renewal, on which could depend its future evolution as a member of a national complex of companies operating in highly sophisticated technological industries, both old and new. Gurley is obviously the oldest of these, and its survival is greatly to be desired, both for its own sake and for the future of Troy. It is perhaps noteworthy that out of Troy's past only two major institutions have persisted and grown, by adaptation to new conditions. These are significantly related to each other: Rensselaer Polytechnic Institute, originating in Troy in 1824, and W. & L. E. Gurley, manufacturer of surveying and other "mathematical and philosophical" instruments, dating from 1845.

C. Sources of Information:

1. Unpublished sources:

Consultation with and materials obtained from Mr.
Charles E. Smart and Mr. Robert G. Betts, former
presidents of W. & L. E. Gurley.

MS. autobiographical sketch of Edward J. Arms, 1930.

MS. autobiography of Charles E. Smart, 1963.

2. Published sources:

W. & L. E. Gurley. The Gurley Story. Troy, 1947.

In Memoriam, William Gurley. Troy, 1890.

Miscellaneous Catalogues and Manuals published by
W. & L.E. Gurley since 1855.

Smart, Charles E. The Makers of Surveying Instruments in
America Since 1700. Troy, 1962.

Weise, Arthur James. City of Troy and Its Vicinity. Troy:
Edward Green, 1886.

_____. Troy's One Hundred Years. Troy:
William H. Young, 1891.

Prepared by Samuel Rezneck
Professor Emeritus in History
Rensselaer Polytechnic Institute
September 1969

PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Structural character: A typically Victorian commercial expression of Renaissance revival architecture.
2. Condition of fabric: Good

B. Description of Exterior:

1. Over-all dimensions: 130 feet wide, 90 feet deep on Fifth Avenue, and 118 feet along Union Street (Weise, City of Troy and Its Vicinity. Troy, 1886, p. 15). Aside from its extended depth on one side, the building is 16 window bays by 10. It has 15-foot ceilings.
2. Shape: A rectangular, 4 story building.
3. Foundation: Cut stone, light in color, probably limestone.
4. Wall construction and finish: Brick bearing wall pierced by arcaded windows and doorways with limestone pilaster capitals.
5. Structural system: Exterior brick bearing walls and interior cast-iron columns and beams approximately 8 inches in diameter.
6. Stoops and balconies: Cut stone entrance stoop. Two cantilevered cast-iron balconies added to the Fulton Street facade near Union Street.
7. Chimney: Red brick.

8. Openings:

- a. Doorways and doors: For such a regular building, the entrances are arranged quite asymmetrically. The principal entrance at the eastern end of the Fulton Street facade is flanked by two windows and topped with a triple, round-arched entablature reading: "ENGINEERS & SURVEYORS INSTRUMENTS". The secondary entrance, at the southwest corner of the building (Fulton and Fifth) has an entryway created by two perpendicular open arches separated by the heavy brick corner pier. Wrought-iron scrollwork gracefully fills the open fan-lights. There are simple, double wooden doors with long rectangular glazing recessed in the entry.
- b. Windows: Wooden framed windows are set into the round brick arches on the first, second, and third floors and into segmental arches on the fourth. The first floor windows are plate glass with the fan area, at present, opaqued or filled with air conditioners. On the second, third, and fourth stories, the windows are double hung with 12-over-12 and 9-over-9 glazing, depending on the size of the arch.

9. Roof:

- a. Shape and covering: Flat, tar covered roof.
- b. Cornice and eaves: Galvanized metal eaves. Heavily bracketed cornice (now missing on Union Street face) and name and date partial-parapet centrally placed on the Fulton Street facade.

C. Description of Interior:

1. Floor plans: Large open space structured by painted, cast-iron columns. The first floor is subdivided into office space, and areas for storage and shipping; the open areas on the other floors are used for the manufacturing activities.
2. Wall and ceiling finish: The walls are painted plaster with a smooth trowel finish. In the office reception area, there is a notable stamped metal ceiling.
3. Doors and doorways: Wooden frames and doors with rich Victorian detailing.
4. Special cabinetwork: A built-in, cherrywood cabinet with nineteenth-century classical detailing serves as an information desk and space divider in the entry office.
5. Notable hardware: The door hardware is cast metal, quite elaborate, and in a classical manner.

D. Site and Surroundings:

1. Setting: The front of the building faces south on Fulton Street. Directly behind its west side along Fifth Avenue is a row of modest Victorian townhouses.
2. Outbuildings: The Gurley Company also owns the buildings across Fulton Street and to the east across Union Street. These were probably built no later than the 1860s. The building to the east has a fine, cast-iron front on the first story.

Prepared by Richard J. Pollak
Professor of Architecture
Ball State University
4 September 1969

PART III. PROJECT INFORMATION

These records were prepared as part of the Mohawk-Hudson Area Survey, a pilot study for the Historic American Engineering Record which was established in 1969 under the aegis of the Historic American Buildings Survey. The project was sponsored jointly by the National Park Service (Historic American Buildings Survey), the Smithsonian Institution (National Museum of History and Technology), the American Society of Civil Engineers (National Headquarters and Mohawk-Hudson Section), and the New York State Historic Trust. The field work and historical research were conducted under the general direction of Robert M. Vogel, Curator of Mechanical and Civil Engineering, Smithsonian Institution; James C. Massey, Chief, Historic American Buildings Survey; and Richard J. Pollak, Professor of Architecture, Ball State University, Project Supervisor; and with the cooperation of the Department of Architecture, Rensselaer Polytechnic Institute.